

Transverse size (drift distance and wire-length are key to cost/mass)

Purification - drift-distance

general R & D, specific scaling issues ..

MicroBooNE 2.5 meters, 0.5kV/cm => 125 kV, 1.7 milliseconds

100 kton, 5 meters => 250 kV, 3.3 milliseconds

transverse size limitations:

dispersion ($1 \text{ mm}/(\text{millisecond})^{1/2}$),

positive ions from cosmic rays

(see: lartpc-docdb.fnal.gov/cgi-bin/ShowDocument?docid=160)

radioactivity (1 Bq/kg)

MicroBooNE will (inevitably) make significant contributions to both HV and purification issues.

Purification:

Believe we can scale MicroBooNE purification system to massive detectors;

Can learn properties of TPC materials in test stands; and will test all materials to be consistent with 10 ms drift lifetime;

Will test the key issue of clean argon from atmosphere without evacuation in small systems and in MicroBooNE

Need: costs of cryogenic and purification system versus mass...some work has been done here